The HL7 CIMI Workgroup: Creating Detailed Clinical Models to Support FHIR Interoperability

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Current Situation

- Each EHR vendor uses a proprietary database schema, proprietary models and unique terminology to represent clinical data
  - Some standardization of codes is now occurring, \textit{but}
  - Data is not consistent vendor to vendor, or even organization to organization within the same vendor

- \textbf{This means that:}
  - Sharing of data is difficult
  - Sharing of executable software across vendors is impossible
  - Each useful application is created or re-created on each different platform
  - There are unmet needs for health care applications and decision support
  - Software costs are higher than they need to be
The Future Ecosystem

- Standards are defined that enable “truly” interoperable systems using standards based services

- Old and new EHR vendors:
  - Support standards based services (HL7 FHIR®)
  - Support SMART® applications

- Thousands of people develop software that runs on truly interoperable platforms
  - Open source, academics, and for profit developers
  - Apps, including clinical decision support algorithms, are for sale in a vendor neutral app store
  - Apps can be certified as HSPC compliant
  - Platform vendors certify apps as safe for use in their platform
The Future Ecosystem (2)

- People buy a patient data platform
  - Includes auditing, security, authorization, patient selection, etc.
  - May include some core apps: order entry, results review, notification, etc.
- People buy the apps they need
- A marketplace for sharing knowledge, especially protocols, workflows, order sets, ontologies
- Patients receive better care at a lower cost because lower cost higher quality apps are available as driven by market forces
SMART on FHIR®© – Open Platform Architecture

- SOA Orchestration
- mHealth
- OAuth
- FHIR Profiles from CIMI Models (using standard terminology)

Heterogeneous Systems:
- Commercial EHR
- Home Grown System
- System Integrator
- Others…

FHIR Profiles from CIMI Models (using standard terminology)

http://smartplatforms.org/smart-on-fhir/
What are the Challenges?

- Enlisting the large EHR vendors to support standards based services and architecture
  - Everyone currently has their own library of services
  - Vendors are developing their own “app stores”
- Uniform implementation of truly interoperable services
  - The vendors have FHIR libraries and development environments, but they are not truly interoperable
Profile for “Blood pressure”

**Observation = Blood Pressure**
Subject.reference: Patient URL
Coding: LOINC 55284-4

Related:
- type: has-component
target.reference: Observation URL
- type: has-component
target.reference: Observation URL

**Observation = Systolic BP**
name: “Systolic”
coding: LOINC 8480-6
value.units: “mmHg”

**Observation = Diastolic BP**
name: “Diastolic”
coding: LOINC 8462-4
value.units: “mmHg”
What if there is no shared model?

Site #1
Dry Weight: 70 kg

Site #2
Weight: 70 kg
○ Dry
○ Wet
○ Ideal
CIMI

- The Clinical Information Modeling Initiative (CIMI) is an HL7 Work Group that is producing detailed clinical information models to enable interoperability of health care information systems
- CIMI was initiated during a “Fresh Look” session at an HL7 meeting in 2011
- CIMI models are free for use for all purposes
- [http://www.opencimi.org/](http://www.opencimi.org/)
CIMI Goals

- Create a shared repository of detailed clinical information models
- Repository is open to everyone and models are licensed free for use at no cost
- Where the models:
  - Are expressed in an approved formalism
    - Archetype Definition Language (ADL)
    - Archetype Modeling Language (AML)
  - Are based on a core reference model, including a set of base data types
  - Have formal bindings to standard coded terminologies
CIMI creates “computable logical models.”

- The models are algorithmically processable
- Models show the structural relationship of the model elements (containment)
- Models are expressed in a formal computable format
- Coded elements have explicit binding to allowed coded values (attributes and values)
- Models are independent of any specific programming language, implementation technology, or type of database
- The models must support explicit, unambiguous query statements against data instances
Current Activities

- Development of tools
  - Model authoring, value set authoring, app development
- ~2,500 laboratory models
- Translation of 6,000+ Intermountain models
- FHIR “Dictionaries”
- CIMI Profiles and Conformance Testing
- To Do
  - Further refinement and use of AML
  - CIMI registry and adoption tables
  - Development of new content: vital signs, diagnoses, procedures, patient measures, ...
Questions?